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ENHANCING SELF-MONITORING WITH DIFFERENTIAL NEGATIVE
REINFORCEMENT OF ALTERNATIVE BEHAVIOR FOR INCREASING
STUDENTS' WRITING PRODUCTION

by

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University of Nebraska, 2019

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Writing is a difficult task for many students who find it aversive, and who attempt to escape the task. Self-monitoring and differential negative reinforcement of alternative behavior (DNRA) are two approaches that have been shown to improve quantity of performance, but no studies were found that combined the two methods to determine whether they are more effective in combination than in isolation. The purpose of the present study was to evaluate the effectiveness of using DNRA to enhance self-monitoring for increasing writing productivity using a multiple probe, across participants design. Number of words and number of sentences were measured. For each baseline session, students were given 10 minutes to write about a prompt, received a short break, then wrote about a second prompt. During the self-monitoring phase, students performed the sessions exactly as baseline, except after they finished writing each prompt, they counted the number of words they wrote, marked that number in a box, and graphed that number. During the second intervention phase, students performed the sessions exactly as the self-monitoring phase, but they were informed they could escape from the second prompt by increasing the number of words they wrote. Results presented an increase in the number of words and sentences written for one participant, while the other two participants showed little to no improvement during the self-monitoring plus DNRA

phase and experimental control could not be established. Areas for future research, limitations, and implications for practice are discussed.

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CHAPTER 1: INTRODUCTION

Writing is an important skill for success in school and beyond (National Commission on Writing, 2004; National Commission on Writing, 2005). Yet, it is an area in which students struggle (Achieve Inc., 2014; ACT, 2014). Many reviews have found writing to be a difficult task for students (Achieve, Inc., 2014; ACT, 2014; National Commission on Writing, 2003; National Commission on Writing, 2004). According to the 2011 National Center for Education Statistics (2012), 73% of high school students wrote at or below basic levels. Achieve, Inc. (2014) and ACT (2014) found that 36% of students who took the ACT were not prepared for college-level writing courses and that 34% of high school graduates in the workforce displayed gaps in their writing education and quality of writing expected on the job.

One reason it is difficult to improve writing outcomes is because many students view writing to be a difficult and especially unpleasant task (Bruning & Kaufmann, 2016; Boscolo & Gelati, in press). For example, Wray (1993) found that children expressed negative perceptions about writing, primarily because it was viewed to be a very tedious task. Villalóna, Mateosb, and Cuevasc (2015) found that beliefs about writing also predict writing performance. Specifically, students with negative beliefs about writing had negative outcomes with writing performance (Sanders-Rieo, Alexander, Reio Jr., & Newman, 2014; White & Bruning, 2005). Consequently, writing tasks may result in students displaying more escape behaviors than during any other activities in other academic content.

Therefore, it is important to find strategies to motivate students to engage in writing tasks and increase their production using the skills they possess. One motivational strategy that has been well-researched and may impact writing is self-monitoring (Wolfe, Heron, & Goddard, 2000). Differential Negative Reinforcement of Alternative Behavior (DNRA) may be another

strategy that increases motivation for students who find writing unpleasant because it can permit a student to escape the second half of a writing task by increasing production on the first part (Holtz & Daly, 2019). Self-monitoring and DNRA may be effective methods to increase writing productivity.

Self-Monitoring Research on Writing

Self-monitoring consists of three components; self-observation, self-recording, and self-graphing (Goddard & Sendi, 2008). There have been two systematic reviews with conclusions indicating that self-monitoring was highly effective in improving reading for students from kindergarten to twelfth grade (Guzman, Goldberg, & Swanson, 2018; Joseph & Eveleigh, 2011). Self-monitoring has also been used to improve math fluency (e.g., Maccini & Hughes, 1997). Much research has been conducted on the efficacy of self-monitoring to improve on-task and decrease off-task behavior (e.g., Bruhn, McDaniel, & Kreigh, 2015). However, one area that has received far less attention is writing. In fact, there were only four studies found that examined the effectiveness of self-monitoring on writing productivity and/or quality (Ballard & Glynn, 1975; Goddard & Sendi, 2008; Rumsey & Ballard, 1985; Wolfe et al., 2000).

Ballard and Glynn (1975) used self-monitoring with a self-assessment component to improve several aspects of writing. They focused on improving number of sentences and describing words, as well as on-task behavior by self-monitoring and self-recording sentences, action words, and describing words. Participants also self-reinforced sentences, action words, and describing words in separate interventions. This intervention was given to 14 randomly selected students who were between eight and nine years of age. With self-reinforcement contingencies, substantial increases in number of sentences, action words, and describing words.

However, additional features to the study, such as checklists for writing quality, could have improved results.

Goddard and Sendi (2008) built on Ballard and Glynn's (1975) study by including a checklist for students with learning disabilities (one female and three males, ages eight to 10). The students self-monitored the number of words written when given story starters and completed a checklist recording how many out of seven writing quality steps they included in their essays. Results indicated increases in both writing quantity and quality.

Writing quantity and quality are important, but on-task and off-task behavior is another essential factor to investigate as it may interfere with writing. Rumsey and Ballard (1985) used self-monitoring to successfully increase the number of words written while also investigating the impact of self-monitoring for on-task and off-task behavior. They looked to increase on-task behaviors and decreased off-task behaviors for six boys and one girl who ranged in age from nine to 11 years old who displayed disruptive behaviors during writing tasks. Increases in on-task and off-task behavior resulted in increases in the number of words written.

Finally, Wolfe et al. (2000) used similar measures by self-monitoring attention and self-monitoring number of words written for four male 9-year-old students with learning disabilities who displayed off-task behaviors during writing activities. Results indicated an increase in both on-task behavior and number of words written, however, there was greater improvement in on-task behavior than number of words written.

Differential Negative Reinforcement of Alternative Behavior (DNRA)

An intervention that may be effective for improving writing may be DNRA (Holtz & Daly, 2018). For example, for students who want to escape an academic task, DNRA would consist of letting that student know that if he or she can complete a certain amount of work at a

predetermined criterion level that exceeds baseline levels of performance, then he or she would not have to do the remainder of the work for that session—hence being able to escape the task by demonstrating higher performance on the first part of the task. MacArthur, Jennings, and Philippakos (2018) found that longer essays and writing have been determined as having higher writing quality and scores. Therefore, the potential increase in writing may also increase writing quality as well. Writing more could potentially increase writing quality as writing more may build stamina and increase overall quality. Many researchers have conducted several studies using DNRA to decrease problem behaviors associated with escaping an aversive task (Golonka, et al., 2000; Marcus & Vollmer, 1995; Piazza, Moes & Fisher, 1996; Vaz, Volkert, & Piazza, 2011; & Vollmer, Roane, Ringdahl, & Marcus 1999).

Golonka et al. (2000) compared two forms of DNRA: (1) participants getting a break from a task and (2) participants getting a break to access preferred activities. Two females, ages 12 and 30 participated in the study. Both participants' inappropriate behaviors were analyzed and determined to be performed to escape tasks. The study took place in a classroom divided in two sections, a quiet area with a small table and one chair (escape) and the other that contained toys, television, and radio (escape to preferred activities). Results indicated that DNRA both decreased participants' aberrant behaviors and improved appropriate behaviors.

Marcus and Vollmer (1995) investigated two types of DNRA and their effects on compliance on a 5-year-old female with Down syndrome, language delays, and speech and articulation difficulties who displayed disruptive behavior. The study took place in a quiet room in the participant's school. The first DNRA technique required the participant to engage in a predetermined increase in communicative behavior to escape the remainder of the task. In the second type of DNRA, if the participant engaged in compliant behaviors, she could escape the

remainder of the task. Both DNRA interventions (DNRA communication and DNRA compliance) resulted in substantial decreased disruptive behavior. However, increases in compliant behavior only occurred in the DNRA compliance condition.

Piazza, Moes, and Fisher (1996) used a DNRA procedure to decrease escape-maintained destructive behavior and increase compliance in an 11-year-old boy diagnosed with autism and a mild intellectual disability. He displayed a variety of destructive behaviors such as hitting, kicking, pinching, head butting and banging, pushing, throwing objects, biting, throwing objects, and destroying property. The participant was required to complete a predetermined number of academic trials while seated at a table in a small room of a hospital. The DNRA condition consisted of letting the participant leave the room for 10 min., contingent on following a certain number of instructions. This procedure resulted in near-zero levels of destructive behavior and increases in compliance.

Roberts, Mace, and Daggett (1995) compared differential reinforcement of other (DRO) behavior to DNRA. The participant was a 4-year-old female with a severe intellectual disability hospitalized for engaging in self-injurious behaviors including head hitting, buttocks slamming, and face slapping. The study took place in a bathroom containing a large bathtub, sink, and mirror. Both treatments took place during bathing and tooth-brushing activities. The DNRA condition consisted of the participant receiving a 15-min break contingent upon compliance with instructional requests within 3 sec. The DRO sessions were identical to DNRA except that when the participant refrained from engaging in self-injurious behaviors for 20 continuous seconds, she received 15-s of escape from the task, and when she was compliant, she received praise, but not escape. Both conditions were effective but DNRA resulted in greater behavioral improvements than DRO.

Vaz, Volkert, and Piazza (2011) studied the effects of DNRA on the self-feeding of a 6-year-old normally developing male who was referred to an outpatient program for treatment of food refusal based on its type and texture. All sessions were conducted in a room containing a table, chair, large spoons, bowls, and Nuk brush. The dependent variable consisted of the participant using a spoon or fingers to place a bite of food into his mouth within five seconds of presentation. The participant was given a presentation of four bites of food every 30 seconds. The DNRA condition required the participant to take one bite of target food within 5 seconds to escape subsequent presentations of food. This procedure resulted in substantial increases in self-feeding behavior.

Vollmer, Roane, Ringdahl, and Marcus (1999) used a DNRA in the classrooms of two participants who displayed escape behaviors: a 4-year-old male with a moderate to severe intellectual disability who engaged in hitting, scratching and hair pulling, and a 17-year-old female with a profound intellectual disability who engaged in head hitting, hand biting, scratching, hitting, and pulling hair. Participants received a 30 second break contingent on following a certain number of directions. Both participants received a functional behavioral assessment (FBA) to determine the function of their behavior. The 4-year old participant's behavior was determined to be maintained by escape and, consequently DNRA was implemented. The second participant's behaviors functioned as access to materials and, therefore, differential reinforcement of an alternative (DRA) behavior was the intervention. Results indicated that both DNRA and DRA for each participant substantially decreased inappropriate behavior and increased appropriate behavior.

These studies demonstrate that DNRA can be an effective motivational strategy to improve performance on a variety of tasks. However, there was only one study found that

addressed the effects of DNRA and writing. Holtz and Daly (2019) examined the effects of DNRA being added to an instructional package. There were six male participants in this study: two were in tenth grade, one in eleventh grade, and three in twelfth grade. Two of the participants received special education services. Participants were given story starters and told to write about the given topic. Dependent variables were number of attempted revisions, number of correct revisions, and number of attempted unique revisions. Participants were told that if they reached or exceeded a certain concealed criterion number of revisions (number on a sealed notecard) they did not have to complete another writing task. Results showed that adding DNRA to the instruction package increased the number of attempted revisions, the amount of correct revisions made, and the number unique revisions. However, this study did not address other aspects of writing, such as increasing productivity.

Purpose of the Present Study

The purpose of the current study was to examine the effectiveness of two motivational strategies to increase the number of words and sentences for participants who were given writing prompts and told to write an essay about them. The first motivational strategy used was self-monitoring productivity, which included students writing and graphing the number of words written after writing a passage. However, many students find writing unpleasant and want to escape it as quickly as they can, thereby resulting in low writing production. Therefore, DNRA was added to self-monitoring in a multiple probe, across participants design. Number of words and sentences written were recorded during baseline, which was followed by the next phase that included the implementation of self-monitoring. The third phase was adding DNRA to self-monitoring. There were two questions of interest in conducting this study. First, does self-monitoring the number of words written improve participants' amount of writing during a

writing activity? Second, does adding DNRA to self-monitoring further improve the amount of writing on a writing activity?

CHAPTER 2: METHOD

A multiple probe, across participants design, was used because it had several positive features. The multiple probe design is similar to a multiple-baseline design and has the same logic. The only difference is that a multiple probe design does not require as many data points during baseline which, otherwise, could result in a practice effect for participants in the second and third tiers. The multiple probe design is likely to reduce practice effect of writing more words/writing faster. Regardless, multiple baseline/probe designs do not require treatment withdrawal. This is important to writing because it provides continuous data to chart improvements. Multiple probe designs also allow for gradual application of the treatment to observe continuous improvement rather than examining only terminal improvement. Also, while staggering levels, participants, settings, or behaviors, they can serve as their own control.

Further, control is established when performance changes in terms of level and/or trend with the introduction of treatment and when the data points in baseline remain stable across participants. This is often a desired design when control groups are not possible. With the staggering levels of the multiple probe design, three overlapping data points, as well as a stable trend for all participants was required prior to moving any participant from baseline to intervention. For instance, the researcher kept Stephen in baseline until each participant completed three baseline sessions. The researcher kept Alex and Henry in baseline for at least three of Stephen's self-monitoring sessions to check for stable baseline trends while one participant was given an intervention. The researcher kept Henry in baseline until Alex completed at least three self-monitoring sessions as well. The researcher kept participants in a phase for at least four sessions to determine that a stable trend was established prior to moving to another phase. The multiple probe design guards against several internal validity threats,

including history, maturation, and can detect assessment-related effects through testing and repeated measurement (Kazdin, 2011).

Participants

Participants in this study were three males in third and fourth grade; Stephen, a 10-year old fourth-grade African American male, Alex, a 10-year-old fourth-grade Caucasian male diagnosed with Autism and Attention Deficit Hyperactivity Disorder (ADHD), and Henry, a third-grade Caucasian male. Participants had been nominated by their tutors or parents because of their aversion to engaging in writing tasks—especially those that require writing a story or essay. The primary language for all participants was English. All three participants were enrolled in a tutoring program at an urban public university. The tutoring program assisted approximately 45 children at that time. Participants were selected because they were elementary school students in first to sixth grade who lacked motivation to complete writing tasks. Participant recruitment and consent are described in the procedure section.

Setting

The researcher conducted all sessions in a private research lab at an urban public university. While the researcher conducted the study, only the participant, primary researcher, and another graduate student (periodically attending sessions to collect fidelity data) were in the lab. The lab area consisted of one rectangular table with six chairs, two chairs at each long side of the table and one at each short side of the table. The walls did not contain shelves or cabinets with any educational material. On the south wall, there was a whiteboard. Only materials needed to conduct the experiment were in the lab area during the study. Participants met with the researcher following their tutoring session to improve their reading and writing, not associated with the current research study. For Stephen, during sessions eight and nine, the study

was implemented in a quiet conference room approximately the same size and with a table of similar size as the research lab where all other sessions took place.

Materials

There were three materials used in the current study: (1) a pencil and lined paper with writing prompts at the top, (2) self-monitoring sheet to record the number of words written, and (3) and bar graphs for participants to shade based on the number of words written. Each is described below.

Pencil and prompts. A pencil and four writing prompts, each on a different piece of lined paper, were provided to each participant each session. For each probe, participants were given two prompts to choose from, as well as a blank sheet of paper for planning and an extra sheet of lined paper. The writing prompts appeared at the top of 8" x 10" lined paper. A typical writing prompt would be, "Write about your favorite sport. Include at least three reasons why you like it." The researcher validated these prompts by consulting with a third-grade teacher and a writing expert— a professor whose major area of research is writing. Collaborating and using feedback on prompts was used to ensure consistency across prompts for more reliable results. If prompts differed greatly in directions, outcomes could differ. The list of prompts appears in Table 2.1.

Table 2.1: List of prompts used

List of prompts used

Write about your favorite time of day. Include at least 3 reasons why you like it.
Write about your best day ever. Include at least 3 reasons why you liked it.
Write about what you want to be when you grow up. Include at least 3 reasons why you would like to do that job.
Write about your favorite place in the whole world. Include at least 3 reasons why you like it.
Write about your favorite book. Include at least 3 reasons why you like it.
Write about your favorite toy. Include at least 3 reasons why you like it.
Write about the funniest person in your family. Include at least 3 reasons why you like him/her.
Write about your favorite superpower. Include at least 3 things you like about it.
Write about your favorite zoo animal. Include at least 3 reasons why you like it.
Write about your favorite book or TV character. Include at least 3 reasons why that character is your favorite.
Write about your favorite sport. Include at least 3 reasons why you like it.
Write about what do you like to do outside. Include at least 3 reasons why you like it.
Write about something you are scared to try. Include at least 3 reasons why you're scared to try it.
Write about someone you look up to and why. Include at least 3 reasons why you look up to them.
Write about your favorite science topic. Include at least 3 reasons why you like it.
Write about your favorite topic from history. Include at least 3 reasons why you like it.
Write about the best gift you ever received. Include at least 3 reasons why you like it.
Write about your favorite part of school. Include at least 3 reasons why you like it.
Write about one of your favorite friends. Include at least 3 reasons why you like them.
Write about your favorite after-school activity. Include at least 3 reasons why you like it.
Write about your favorite thing about your family. Include at least 3 reasons why you like it.
Write about the best movie you've ever seen. Include at least 3 reasons why you like it.
Write about your favorite kind of food. Include at least 3 reasons why you like it.
Write about your favorite thing to do at home? Include at least 3 reasons why you like it.

Self-monitoring sheets. Self-monitoring sheets were developed that were identical to the lined piece of paper with each story starter given during the baseline session. The only difference was that at the bottom lower right side of each sheet there was, "Number of words written." A box appeared below that statement in which participants wrote that number. Appendix A shows a sample self-monitoring sheet.

Self-graphing sheets. Graphing sheets were made to record the number of words written for each writing task. Each sheet of paper contained four columns. Each column was divided into individual squares, to create four graphs. For example, if a participant wrote 20 words, then he would shade the graph up to the number 20. Each column was made to look like a rocket ship to enhance the appearance of the graph. There were a total of four rocket ship graphs on a sheet of 8x10 paper so participants could visually see and monitor performance. A sample self-monitoring graph appears in Figure 2.1.

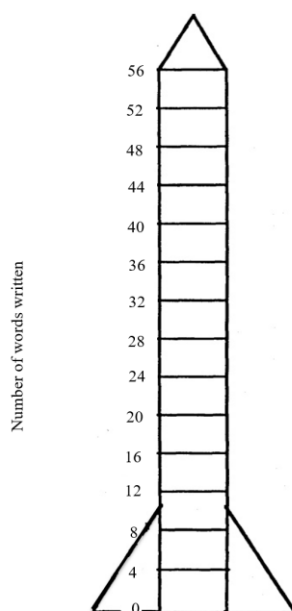


Figure 2.1: Example of a pre-made self-monitoring graph used by each participant to monitor number of words written during the two intervention phases

Dependent Variables

There were two dependent variables collected in the present study: number of words written and number of sentences written. First, number of words written was recorded from each prompt. A word was defined as a letter or group of letters separated by a space. Spelling and grammar were not considered as part of the definition. Second, number of sentences written was

recorded. A sentence was counted if it contained an independent clause with a noun and a verb. Capitalization and punctuation were not considered as part of the definition.

Procedures

Prior to the beginning of the study, the primary researcher obtained approval from the Institutional Review Board (IRB). Next, the researcher contacted parents of potential participants who attended the tutoring center and explained the purpose and structure of the study. Parents who were interested in the study met with the primary researcher and her supervisor. Those who agreed to let their child participate in the study signed the consent form. Finally, prior to beginning baseline sessions, participants signed the assent form. Following participant assent and prior to beginning the baseline session, the students completed a writing sample from the Wechsler Individual Achievement Test – Third Edition (WIAT-III) to determine if escape behaviors were present during writing.

In each phase of the study, the researcher collected and recorded number of words and sentences written for each of the three conditions or phases of the study. All sessions for each condition were approximately 10 min. long. For each meeting with a participant, the researcher conducted two sessions with a 5-min break between each session, unless the student escaped the second task, which was possible during the self-monitoring plus DNRA session only. Participants received directions from a script that the researcher read aloud. If a participant did not record any words, the researcher recorded a zero for both number of words and sentences for that prompt. The study consisted of three different conditions.

Baseline/control. During baseline, the researcher prepared four lined sheets of paper with randomly selected story starters on each. For the first writing sample of the session, she randomly gave participants two of the writing prompts, read them aloud along with scripted

directions (e.g., “try to write as much as you can about the topic”), and told them to select which one they wanted to write about first (see Appendix B). The researcher placed the unselected story starter aside for future sessions selected at random by a random number generator. The researcher then asked the participant to write about the topic for 10 min. After 5 minutes passed, the researcher stated, “You have 5 min. left to write.” After 9 minutes passed, the researcher stated, “you have 1 min. left to write.” If the participant finished before the time limit and less than 30 words were written, the researcher stated, “try to write a full page.” If fewer than 30 words were written and the page was full, the researcher turned to the next blank lined page and stated, “try to write more.” If the participant did not write more after one request, the time elapsed was recorded and the probe was complete. If the participant finished before the time limit and more than 30 words were written, the researcher recorded the time elapsed and the probe was considered complete.

After the first 10-min writing task/session ended, the participant received a 5-min break that consisted of taking a walk inside the building. After the break, the second 10-min writing task/session began, in the same manner as the first task. The researcher read aloud the two remaining prompts and directions, followed by the participant choosing one of two story starters to write about for the second task. She then set aside the unselected story starter prompt for future sessions. The session ended after the completion of the writing task, with the same conditions as above. During baseline, participants did not come in contact with any planned, contingent motivational (i.e., reinforcement) consequences, nor did they receive any feedback from the researcher as to how well they performed.

Self-Monitoring. This phase followed the same procedure as that for baseline except the researcher told and showed participants that the story starter paper had a box with instructions at

the bottom that said, “number of words written.” Participants received directions from a script that the researcher read aloud, found in Appendix C. The researcher then pointed to the box directly below that direction with the label “number of words written.” After participants finished the writing task/session, the researcher instructed participants to count up the number of words they wrote and write that number in the box. After the participant wrote the number in the box, she showed participants a piece of paper placed next to the story starter that contained a bar graph with five columns (Figure 2.1). They were shown that each column was divided into individual squares and the direction written at the top of the paper, “Shade in the squares on the graphs for the number of words you wrote on your writing sheet.” After participants counted, recorded, and graphed the number of words written for the first 10-min writing task/session, they received a 5-min break, as was the case during baseline. Then the second 10-min writing task/session began and proceeded in the same fashion as the first task and ending with participants counting, recording, and graphing the number of words written. During self-monitoring, participants did not come in contact with any planned, contingent motivational (i.e., reinforcement) consequences.

Self-Monitoring plus DNRA. The researcher conducted the third phase similar to the previous self-monitoring phase, with one important difference. Before instructing the participant to write the first prompt, she introduced the DNRA contingency at the beginning of the first writing sample using the script that appears in Appendix D. That is, the researcher showed a paper bag to the participants and told them there were slips of paper with different numbers written on them. After they counted, recorded, and graphed the number of words written, the researcher then counted the number of words written. Then, she explained that she would pull a random slip of paper from the bag. The researcher told participants that if the number of words

written was the same or greater than the number of the slip of paper, they did not have to complete the second writing task/session and the session was over and they were permitted to leave.

The researcher determined the numbers written on pieces of paper and placed in the bag in the following way. First, the researcher identified the highest data point from the baseline or self-monitoring phase, whichever phase had the highest data point for each participant. Second, 50% of the highest data point was added to that number. For example, if the highest number of words written during the baseline or self-monitoring phase was 26, then 13 (half of 26) was added to 26 ($26 + 13 = 39$). Third, the number that was one number higher than the highest data point prior to the second intervention phase was written down on a 0.5"x0.5" individual slip of paper and set into the paper bag. That number through 50% of that number added to it, were written on 0.5"x0.5" individual slips of paper and each placed the bag. For instance, if the highest number of words written during the baseline or self-monitoring phase was 26, then the numbers 27 through 39 were written on individual slips of paper and placed into the bag. To ensure non-overlapping contingencies with baseline or self-monitoring points, the lowest number placed in the paper bag was one number more than the highest baseline or self-monitoring point. The purpose was to ensure indistinguishable contingencies for participants so that they would not simply stop writing if they knew the predetermined criterion prior to beginning the first writing task. The motivational aspect of this phase was that participants were negatively reinforced by being able to escape the second writing task by reaching the predetermined but previously unknown criterion. During the self-monitoring plus DNRA phase, participants did not come in contact with any programmed, contingent positive reinforcement.

Inter-observer Agreement (IOA)

Inter-observer agreement (IOA) was scored for approximately 33% of the probes. The researcher scored all writing samples for both number of words and sentences written. A trained graduate student who did not know the purpose of the study also separately counted the number of words and sentences written for reliability purposes. The researcher calculated IOA by dividing the smaller frequency of trial agreements by the larger number of trial agreements and multiplying the result by 100 to obtain a percentage.

Treatment Fidelity

The researcher assessed treatment fidelity by training a graduate student, who did not know the purpose of the study, how to implement each of the intervention phases using the premade instructions and script. The primary researcher then provided the graduate student a checklist containing the steps involved with the implementation of self-monitoring and self-monitoring plus DNRA phases as a basis for determining fidelity. The graduate student marked each step of the intervention process as met or not met and provide that feedback to address treatment integrity. Fidelity checks occurred across each phase and all participants for 47% of probes and s discussed in the results section.

Data Analysis

Data from each session were graphed and analyzed, except for the self-monitoring plus DNRA phase. The reason for only recording, graphing, and analyzing the data from the first writing task for the self-monitoring plus DNRA phase was because participants potentially did not have to complete the second writing task and if students were required to complete the second writing task, it may have been demotivating.

Data were primarily analyzed through visual inspection to identify changes in level, trend, variability, and compare means across phases (Kazdin, 2011). In addition, two types of effect sizes were calculated. First, Tau-*U* values were computed because it controls for monotonic trend (i.e., increasing trends during baseline). There were no found trends in baseline, therefore, the researcher did not correct the baseline. In the current study, participants, especially those in the second and third tier, were in baseline for relatively long periods of time and there could potentially be a practice effect from writing more tasks than the participant in the first tier. Second, improvement rate difference (IRD) was also computed because it provides an effect size similar to the *risk difference* used in medical treatment research, which has a proven track record in hundreds of studies (Parker, Vannest & Brown, 2009). The Tau-*U* and IRD effect sizes were calculated using the www.singlecaseresearch.org/calculators.

CHAPTER 3: RESULTS

Results of the current study are presented in two ways. First data were graphed and subjected to visual analysis. This analysis involved examining data within and across phases to determine the degree to which participants' performance improved from baseline to intervention. Data were inspected to identify trends (i.e., ascending, descending), and levels of stability/instability. Table 3.1 presents the means, ranges, and standard deviations for all three participants across baseline and intervention conditions for number of words written and number of sentences written. Second, results of IRD and Tau-*U* effect sizes are reported.

Table 3.1: Means, ranges, and standard deviations for all participants' results across all phases

<i>Number of Words Written: Means, Ranges, and Standard Deviations</i>			
	Baseline	Self-Monitoring	Self-Monitoring and DNRA
Participant 1	104 (91-120) <i>SD</i> = 16.40	142 (126-158) <i>SD</i> = 15.03	180 (168-195) <i>SD</i> = 11.32
Participant 2	15 (12-20) <i>SD</i> = 2.98	14 (12-14) <i>SD</i> = 1.66	23 (17-33) <i>SD</i> = 7.32
Participant 3	41 (29-53) <i>SD</i> = 7.30	34 (20-49) <i>SD</i> = 10.98	42 (28-50) <i>SD</i> = 10.14
<i>Number of Sentences Written: Means, Ranges, and Standard Deviations</i>			
Participant 1	9 (6-13) <i>SD</i> = 2.86	12 (8-15) <i>SD</i> = 2.50	13 (11-17) <i>SD</i> = 2.65
Participant 2	3 <i>SD</i> = 0	3 (2-4) <i>SD</i> = 0.71	7 (4-11) <i>SD</i> = 3.09
Participant 3	4 (2-5) <i>SD</i> = 0.87	3 (1-4) <i>SD</i> = 1.22	5 (4-5) <i>SD</i> = 0.47

Visual Analysis

Visual analysis was conducted from graphs of number of words written (see figure 3.1) and number of sentences written (see figure 3.2). Number of words written was the primary

measure, used to determine phase changes. Number of sentences written was a secondary measure for the current study. The results of Stephen, Alex, and Henry are discussed below.

Stephen. In terms of number of words written, Stephen's baseline was stable ($m = 104$, range = 91-120, $SD = 16.40$). During self-monitoring, the number words written increased with a fairly stable trend and no data overlap between baseline and this phase ($M = 142$, range = 126-158, $SD = 15.03$). These results showed a functional relation between self-monitoring and Stephen's writing output. During the self-monitoring plus DNRA phase, number of words written continued to increase with a stable and increasing trend ($M = 180$, range = 168-195, $SD = 11.32$). This continually increasing trend indicates a functional relation between self-monitoring plus DNRA and the number of words Stephen wrote.

Stephen's baseline for number of sentences written showed more variability than for number of words written ($M = 9$, range = 6-13, $SD = 2.86$). The trend initially ascended but then descended for three data points before leveling off. During the self-monitoring phase, an unstable, but slightly higher trend can be seen ($M = 12$, range = 8-15, $SD = 2.50$). There were also three overlapping data points with baseline. Data during the self-monitoring plus DNRA phase showed an unstable trend with an ascending trend the first data point and descending trend for the next two data points ($M = 14$, range = 11-18, $SD = 2.83$). Nevertheless, there was an increase in the number of sentences written over the self-monitoring only phase, but there were only two non-overlapping data points.

Alex. In terms of number of words written, Alex's baseline was relatively stable ($M = 15$, range = 12-20, $SD = 2.98$). During self-monitoring, the number of words written decreased with a very stable slightly decreasing trend ($M = 14$, range = 12-14, $SD = 1.66$). The initial increase, leading to a decrease in number of words written did not indicate a functional relation

between self-monitoring and number of words written. Number of words written increased slightly with a very stable trend until a substantially high data point during self-monitoring plus DNRA phase ($M = 23$, range = 17-33, $SD = 7.32$). The increase in number of words written shows a functional relation between self-monitoring plus DNRA and Alex's writing. There were no overlapping points with the self-monitoring only condition. Overall, there was a slight increase in the number of words written over the self-monitoring plus DNRA phase, but there was only one non-overlapping data point with the highest baseline data point.

Alex's baseline for number of sentences written showed a very stable trend ($M = 3$, range = N/A, $SD = 0.00$). A relatively stable decreasing trend can be seen during self-monitoring ($M = 3$, range = 2-4, $SD = 0.71$). There were also three overlapping data points with baseline. Data during self-monitoring plus DNRA phase showed a stable trend with a substantially high data point in the last session ($M = 7$, range = 4-11, $SD = 3.09$). There were no overlapping data points from self-monitoring to self-monitoring plus DNRA. Nevertheless, there was an increase in the number of sentences written over the self-monitoring plus DNRA phase, but there was only one non-overlapping data point. The increasing trend indicated a functional relation between self-monitoring plus DNRA and number of sentences written.

Henry. In terms of number of words written, Henry's baseline was relatively stable ($m = 41$, range = 29-53, $SD = 7.30$). During self-monitoring, the number of words written initially increased from baseline, but continued with a stable but decreasing trend ($M = 34$, range = 20-49, $SD = 10.98$). The stable decreasing trend indicates a negative functional relation between self-monitoring and number of words written. Number of words written increased slightly with a relatively stable trend with a substantially low data point during self-monitoring plus DNRA phase ($M = 42$, range = 28-50, $SD = 10.14$). There was a slight increase in the number of words

written over the self-monitoring plus DNRA phase, but there were not any non-overlapping data points with the self-monitoring phase. The highest self-monitoring plus DNRA data point was the second largest number of words Henry wrote.

Henry's baseline for number of sentences written showed a stable trend ($M = 4$, range = 2-5, $SD = 0.87$). A relatively stable but decreasing trend can be seen during self-monitoring ($M = 3$, range = 1-4, $SD = 1.22$). Data during self-monitoring plus DNRA phase showed a fairly stable trend with a substantially low data point ($M = 5$, range = 4-5, $SD = 0.47$). Nevertheless, there was a slight increase in the number of sentences written over the self-monitoring plus DNRA phase, and there were two non-overlapping data points out of three with the self-monitoring phase.

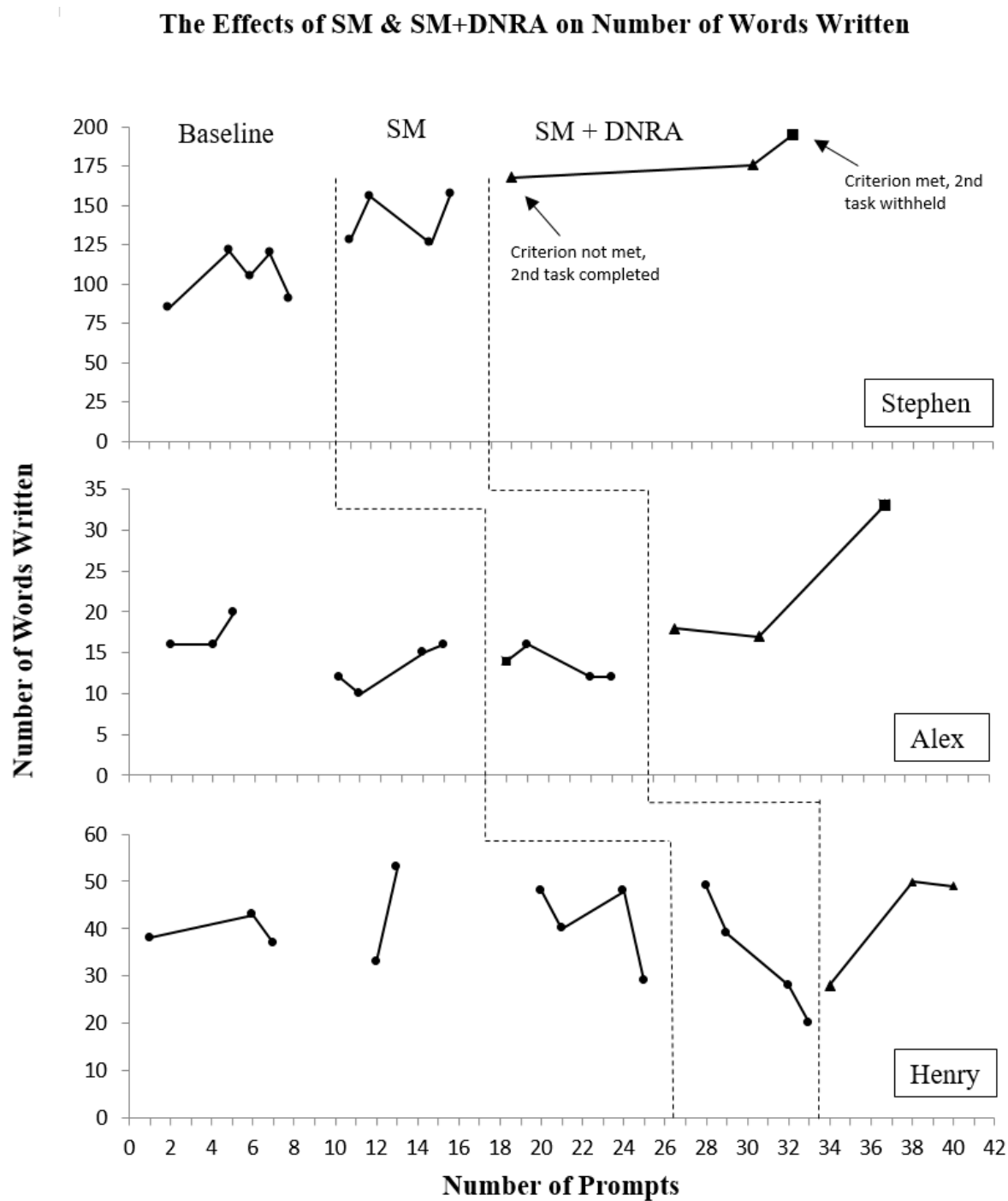


Figure 3.1: Multiple probe across participants graph showing effects of self-monitoring and self-monitoring plus DNRA on number of words written.

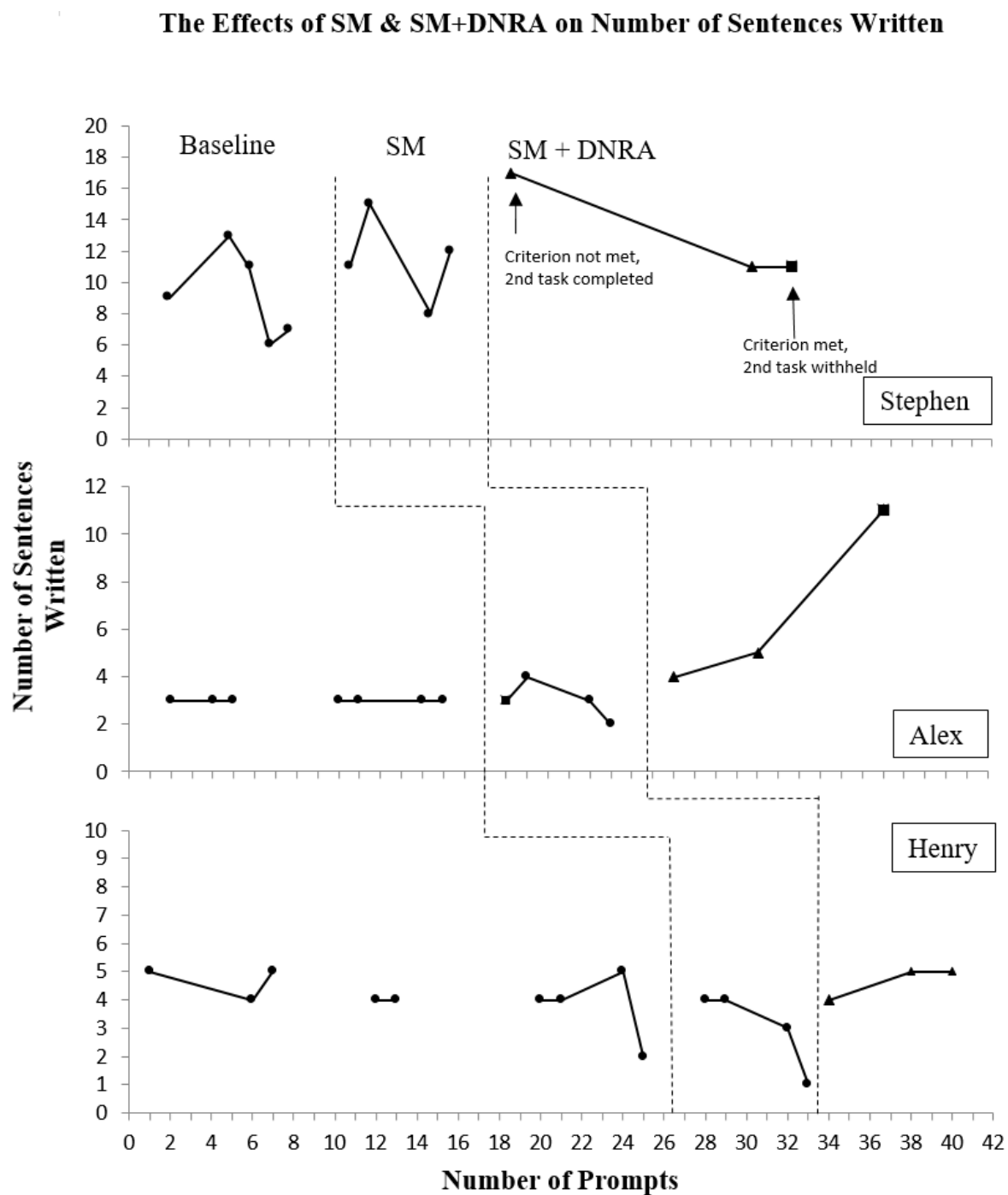


Figure 3.2: Multiple probe, across participants graph showing effects of self-monitoring and self-monitoring plus DNRA on number of sentences written.

Effect Size Calculations

The researcher calculated effect sizes to determine if there were any more nuanced differences between phase improvements. The data for most baselines were stable but were visually characterized as mostly unstable with much trend variability during subsequent phases. Consequently, effect sizes may cast some additional light on the differential effectiveness of self-monitoring only compared to self-monitoring plus DNRA. Effect size ranges for Tau-*U* have been classified as follows: < 0.20 = small; $0.21 - 0.60$ = moderate; $0.61 - 0.80$ = large; > 0.80 = very large (Lee & Cherney, 2018). Effect size ranges for IRD are similar: < 0.367 = ineffective; $0.368 - 0.478$ = small to questionable; $0.479 - 0.717$ = moderate; $0.719 - 0.897$ = large; > 0.898 = very large (Parker, Vannest, & Brown, 2009). Table 3.2 contains the effect sizes, the 90% confidence intervals, and significant P values for all three participants across all conditions for number of words written. Table 3.3 contains the effect sizes, the 90% confidence intervals, and significant P values for all three participants across all conditions for number of sentences written.

Number of words written. Effect sizes across all participants showed very different results. From baseline to self-monitoring, IRD ranged from 0.46 to 1.00, indicating that self-monitoring ranged from showing small to questionable improvement to showing very large improvement on number of words written. Tau-*U* ranged from -0.33 to 1.00, indicating there was small to very large improvement from baseline to self-monitoring. Effect sizes from baseline to self-monitoring were much larger for Stephen than for Alex and Henry. Self-monitoring effect sizes were greater for Alex than Henry for number of words written.

Although not common practice and, effect sizes were calculated between baseline and self-monitoring plus DNRA even though these two phases were not adjacent, consequently,

effect sizes must be interpreted cautiously. From the baseline to the self-monitoring plus DNRA phase, IRD ranged from 0.55 to 1.00, indicating that there was moderate to very large effects on number of words written. Effect sizes for Stephen were largest, indicating that self-monitoring plus DNRA was most effective for that participant. Effect sizes showed that the intervention was more effective for Stephen than for Alex and Henry. Tau-*U* ranged from 0.19 to 1.00, indicating small to very large improvement. Effect sizes were largest for Stephen for both IRD and Tau-*U*. Alex's effect sizes, for both IRD and Tau-*U*, were larger than those calculated for Henry.

From the self-monitoring to the self-monitoring plus DNRA phase, IRD ranged from 0.33 to 1.00, indicating that the transition from self-monitoring to self-monitoring plus DNRA ranged from being ineffective to having a very large effect on number of words written. Tau-*U* ranged from 0.19 to 1.00, indicating there was small to very large improvement from baseline to self-monitoring. Effect sizes from self-monitoring to self-monitoring plus DNRA were much larger for Stephen than Alex and Henry. Effect sizes showed that self-monitoring with the addition of DNRA was more effective for Alex than Henry for number of words written.

Table 3.2: Effect Size Table for Number of Words Written

Effect Sizes: Number of Words Written

	Baseline to Self-Monitoring		Baseline to Self-Monitoring + DNRA		Self-Monitoring to Self-Monitoring + DNRA	
	IRD	Tau-U	IRD	Tau-U	IRD	Tau-U
Participant 1	1.00	1.00 (0.33, 1.00) ^a	1.00	1.00 (0.23, 1.00) ^a	1.00	1.00 (0.23, 1.00) ^a
Participant 2	0.46	-0.32 (-0.94, 0.30)	0.86	0.81 (0.12, 1.00)	1.00	1.00 (0.32, 1.00) ^a
Participant 3	0.50	-0.33 (-0.93, 0.26)	0.55	0.19 (-0.47, 0.84)	0.33	0.50 (-0.28, 1.00)

Note. P= ^a < 0.05, ^b < 0.01, ^c < 0.001

Number of sentences written. Effect sizes for number of sentences written were lowest from baseline to self-monitoring. IRD for all participants for baseline to self-monitoring was

0.25, indicating that self-monitoring was ineffective for increasing number of sentences. Tau-*U* ranged from -0.56 to 0.45, indicating small to moderate improvement. Effect sizes of self-monitoring were larger for Stephen than those for Alex and Henry, but overall slightly effective.

IRD for baseline to self-monitoring plus DNRA ranged from 0.00 to 1.00, indicating that self-monitoring plus DNRA was ineffective to having very large effects on number of sentences written. Effect sizes obtained for Alex were largest. Stephen had larger effect sizes than Henry for number of sentences written. Tau-*U* ranged from 0.37 to 1.00, indicating there were moderate to very large amounts of improvement, with Alex's effect sizes showing the most overall improvement from the intervention.

IRD for self-monitoring to self-monitoring plus DNRA ranged from 0.00 to 0.67, indicating that self-monitoring plus DNRA was ineffective to having moderate effects for increasing number of sentences written. Tau-*U* ranged from 0.50 to 1.00, indicating moderate to very large improvement. Effects of self-monitoring to self-monitoring plus DNRA were the largest for Alex. Henry showed more improvement from self-monitoring to self-monitoring plus DNRA than Stephen. Overall, across all phases, effect sizes for Alex for number of sentences written were generally larger than Stephen and Henry.

Table 3.3: Effect Size Table for Number of Sentences Written

Effect Sizes: Number of Sentences Written

	Baseline to Self-Monitoring		Baseline to Self-Monitoring + DNRA		Self-Monitoring to Self-Monitoring + DNRA	
	IRD	Tau-U	IRD	Tau-U	IRD	Tau-U
Participant 1	0.25	0.45 (-0.22, 1.00)	0.33	0.60 (-0.14, 1)	0.00	0.17 (-0.61, 0.94)
Participant 2	0.25	0.00 (-0.62-0.62)	1.00	1.00 (0.313, 1.00) ^a	0.67	0.92 (0.14, 1.00)
Participant 3	0.25	-0.56 (-1.00, 0.04)	0.00	0.37 (-0.29, 1.00)	0.67	0.83 (0.58, 1.00)

Note. P= ^a < 0.05, ^b < 0.01, ^c < 0.001

Summary of Results from Visual Inspection

Based on visual inspection, and some of the obtained effect sizes, data do not support that experimental control was established for two of the three participants. Alex's data from baseline to self-monitoring and also from baseline to self-monitoring plus DNRA, except for the last data point, were very similar. Henry's data during self-monitoring showed a decreasing trend compared to baseline levels, and also between his baseline and self-monitoring + DNRA phases. Some experimental control was achieved for Stephen—especially between his baseline and self-monitoring plus DNRA phases. Stephen showed the greatest improvement across phases.

Inter-observer Agreement (IOA)

Inter-observer agreement (IOA) was scored for approximately 33% of the probes. The researcher scored all writing samples for both number of words and sentences written with a trained graduate student who did not know the purpose of the study, separately counting the number of words and sentences written. The researcher calculated IOA by dividing the smaller frequency of trial agreements by the larger number of trial agreements, and multiplying the result by 100 to obtain a percentage. The mean IOA for number of words written was 94%. The mean IOA for number of sentences written 72%. The overall mean IOA was 83%.

Treatment Fidelity

To guarantee treatment fidelity, the researcher followed scripted procedures for all phases of the study—baseline, self-monitoring, and self-monitoring plus DNRA (Appendix A, B, & C). There were 47% of the probes that were selected at random. Trained graduate students and professors observed and scored each fidelity session by using a checklist of procedures specifically used for each phase of the study. To calculate treatment fidelity, the total number of

stages executed correctly was divided by the total steps according to the checklist. The result was multiplied by 100 to change it to a percent. The treatment fidelity for this study was 100% for every probe.

CHAPTER 4: DISCUSSION

The purpose of this study was to evaluate the effectiveness of DNRA to enhance self-monitoring for increasing writing productivity for three children. Stephen showed improvement during the self-monitoring intervention and increased performance during the self-monitoring plus DNRA phase. However, the effects of self-monitoring could not be replicated across the other participants. These results are inconsistent with other research using writing and self-monitoring techniques similar to the current study (e.g., Ballard & Glynn, 1975; Goddard & Sendi, 2008; Rumsey & Ballard, 1985; Wolfe et al., 2000). Alex showed no improvement during self-monitoring, but some improvement in performance occurred during the self-monitoring plus DNRA phase. Henry's number of words and sentences decreased during self-monitoring and showed no change during the self-monitoring plus DNRA condition. The results indicated that self-monitoring and self-monitoring plus DNRA were effective for Stephen, but little improvement was made with Alex and Henry. Results for each participant will be discussed and potential variables that impacted the effectiveness of both conditions including participant performance levels prior to beginning the study, participant disabilities, and diverse emotional reactions. For the self-monitoring plus DNRA phase, the researcher recorded, graphed, and analyzed data only if a contingency was in place because participants potentially did not have to complete the second writing task and if students were required to complete the second writing task, this may have been demotivating.

Factors Contributing to the Lack of Experimental Control Being Established

Stephen's performance. Stephen's performance was consistent with results of previous studies with similar self-monitoring interventions and measures (e.g., Ballard & Glynn, 1975; Goddard & Sendi, 2008; Rumsey & Ballard, 1985; Wolfe et al., 2000). His number of words

written increased in both the self-monitoring and self-monitoring plus DNRA phases. During the self-monitoring plus DNRA, Stephen demonstrated a negative emotional reaction (i.e., began crying) for two of the sessions after not meeting the performance criterion to escape the second task. The nature of DNRA is to motivate students to reach certain academic criteria on a first task to escape the second task. A student's failure to meet a goal and experience a negative emotional reaction could negatively impact their subsequent motivation (Deci & Cascio, 1972). Specifically, researchers have found that individuals who were exposed to certain amounts of failure were less intrinsically motivated and persisted in tasks for shorter amounts of time following the failed task than those who did not experience initial failure (Deci & Cascio, 1972; McCaughan & McKinlay, 1981; Weinberg & Ragan, 1979). These negative emotions may result in a student feeling frustrated which, in turn, can negatively impact academic performance (Pekrun, Lichtenfeld, Marsh, Murayama, & Goetz, 2017). Conversely, Pekrun and colleagues (2017) also found that positive emotions have a positive influence on academic achievement, while negative emotions have a negative influence on academic achievement. Therefore, setting more attainable performance criteria may have been more motivating for Stephen.

Alex's performance. Alex's results of a decrease in performance in the self-monitoring condition and a small increase in the self-monitoring plus DNRA phase do not align with previous research. Specifically, self-monitoring has previously been found to improve the writing productivity of children (e.g., Ballard & Glynn, 1975; Goddard & Sendi, 2008; Rumsey & Ballard, 1985; Wolfe et al., 2000). Ballard and Glynn (1975) used self-monitoring with a self-assessment component to result in a substantial increase in number of sentences written and describing words used. Rumsey and Ballard (1985) used self-monitoring to successfully increase the number of words written. Previous research with DNRA has also shown more

substantial positive effects to improve performance on a variety of tasks, including one study examining the effects of DNRA on writing. For example, Holtz and Daly (2019) examined the effects of DNRA on number of writing revisions and found that it increased the amount of attempted revisions, the amount of correct revisions made, and the number of unique revisions. Other studies have also found DNRA to be an extremely effective intervention not only for improving writing productivity but also for decreasing disruptive and destructive behaviors (Golonka, et al., 2000; Marcus & Vollmer, 1995; Piazza, Moes & Fisher, 1996; Vaz, Volkert, & Piazza, 2011; & Vollmer, Roane, Ringdahl, & Marcus 1999).

Although Alex's results did not show large amounts of improvement on the dependent measures, his behaviors during the self-monitoring plus DNRA phase showed that it may have been slightly motivating for him. For instance, for each prompt, Alex would count some words multiple times and would argue with the researcher that he wrote more than she counted. He may have done this to try to escape the second task, but without writing more on the first task.

Alex's motivation to complete all writing tasks was very low. For example, his handwriting was difficult to read because each letter was sloppily written and was so large it overlapped up to eight lines of the paper on the writing prompts. Further, he ended each writing prompt early, with his longest work time being just over 4 minutes out of a 10-minute session. A typical writing sample would consist of such words, phrases, or sentences such as "I like it." "I love it." "I hate it." He would often write "turd" at the end of his prompt. Notably, he ended every break early, potentially because he found it more negatively reinforcing to finish both writing tasks quickly and leave rather than taking more time to complete the first task with higher productivity and escape the second task.

The short, repetitive nature of his writing was consistent with his dual diagnosis of Autism and attention-deficit/hyperactivity disorder (Reid, Hagaman, & Graham, 2014). In a literature review by Schaefer Whitby and Mancil (2009), they found that a majority of students with high functioning autism showed weakness in the areas of written expression and graphomotor skills. It was also noted that 60% of those included in the review had writing learning disabilities.

Children diagnosed with ADHD also often struggle academically in many areas, including writing (Barry, Lyman, & Klinger, 2002; Reid, 2012). Current research indicates that writing may be one of the most common academic subjects that cause difficulty for those with ADHD, and approximately 65% qualify for a learning disability in the area of writing (Mayes & Calhoun, 2006, 2007). Students with ADHD write less, do not include important writing elements (e.g., topic sentence), and have a lower overall quality than those without ADHD (De La Paz, 2001; Jacobson & Reid, 2010; Lienemann & Reid, 2008).

Henry's performance. Both intervention conditions were ineffective for increasing writing productivity for Henry. Henry's data shows an almost perfectly linear descending trend from baseline to self-monitoring. This linear trend indicates that self-monitoring may have been unpleasant for him or he may have simply been disinterested in the task itself and the types of writing prompts he received (Bruning & Kaufmann, 2016; Boscolo & Gelati, in press; Sanders-Rieo, Alexander, Reio Jr., & Newman, 2014; Villalóna, Mateosb, and Cuevasc, 2015; White & Bruning, 2005; and Wray, 1993). For example, he would frequently say things like, "Hopefully I can write enough, sometimes it depends on the prompt" and "50?! But that's such a big number!" and "I think all the numbers are over 50, that's not even fair." Hidi and McLaren (1991) specifically found that topic interest can positively or negatively impact children's

writing. Additionally, students with negative beliefs about writing had negative outcomes with writing performance (Sanders-Rieo, Alexander, Reio Jr., & Newman, 2014; White & Bruning, 2005). Consequently, and like Alex, Henry's attitude may have inhibited better writing productivity. (e.g., Ballard & Glynn, 1975; Goddard & Sendi, 2008; Rumsey & Ballard, 1985; Wolfe et al., 2000).

Limitations

The present study cannot be properly interpreted without including a discussion of its limitations. The first, and major limitation was that experimental control could not be obtained. The lack of experimental control was most likely due to characteristics of the participants, most likely due to the lack of screening procedures. All three participants were at very different academic levels with some with and without disabilities that may have affected the outcome of the intervention. Self-monitoring plus DNRA may be effective for students more like Stephen, who showed some motivation in writing, but still engaged in some escape behaviors (e.g., blowing his nose, shooting used tissues into the trash, and dropping items on the floor to pick them up). Participants who may not benefit are those who engage in large amounts of inappropriate behavior. In this type of situation, adding positive reinforcement may increase his motivation.

Second, although results for each participant varied, the session times (i.e., 10 min.) for the study posed several problems for different participants. As discussed earlier, for Stephen, the time limit expired while he was still writing. As he already wrote between 80 and 120 words prior to intervention, he then needed to write faster to increase the number of words written. Although writing sessions were 10 minutes in length, it was not mandatory that participants write for the entire 10 minutes. Alex would write for short periods of time and, consequently, ended

each writing prompt early. This practice could have also affected his writing productivity and the effectiveness of the interventions. Another limitation due to time was the range of numbers to escape the second writing task during the self-monitoring plus DNRA phase. To determine the range of numbers placed in the bag for each participant, the researcher took 50% of the highest data point from the baseline or self-monitoring phase, whichever phase had the highest data point for each participant and added that to the highest baseline or self-monitoring point. To ensure non-overlapping contingencies with baseline or self-monitoring points, the lowest number placed in the paper bag was one number more than the highest baseline or self-monitoring point. Stephen's highest self-monitoring data point was 158 words, which left the range of numbers for DNRA between 159 to 237 words. The range of numbers may have been too high for Stephen to attain, only given 10 minutes. Like Stephen, Henry also wrote for the entire 10 minutes but did not generate as many words or sentences because he seemed to have struggled with idea generation. Consequently, a time period longer than 10 minutes may have reflected more accurately the number of words and sentences that he wanted to write but was unable because of the time expiring.

Third, although during the self-monitoring phase students were instructed to count the number of words written and graphs were in direct view of each participant, the researcher did not specifically draw participant attention to the graphs before writing. Therefore, they did not see progress on the graph from previous writing prompts unless they looked at them without the researcher's instruction to do so. Furthermore, the graphs pre-made for students did not show a consistent scale on each. The researcher did not use baseline data for the scale on the rocket to keep a consistent scale on the rocket. Participants may not have seen the amount of progress they made due to varying scales on rockets. Additionally, there was no goal-setting component

during the self-monitoring phase. This omission may have altered the success of self-monitoring, as goal setting has shown an increase in self-monitoring effectiveness (Maag, 2018).

Fourth, prompt selections may have impacted the amount participants wrote. The researcher re-used prompts that were not chosen from previous sessions. Although participants were given two prompt options for each probe, the re-used prompts were sometimes two initially rejected by participants from prior sessions. This practice may be a limitation because the prompts were sometimes two options that the participants may not have any contextual knowledge of or did not find interesting. Hidi and McLaren (1991) specifically found that topic interestingness can positively or negatively impact children's writing. For all three participants, there was at least one prompt that they wrote about something other than the prompt chosen. For instance, for one prompt, Henry specifically said that he would write about a topic from history if he knew what it was. This may have limited the amount the participants could write.

Fifth, scoring may have been limitation for the results with the study. IOA for number of words written was 94%, however, IOA for number of sentences written was 72%, which was less than the desired 80%. More training and practice with a second scorer would be beneficial to increase reliability for number of sentences written. Although IOA for number of sentences written was lower than desired, the primary dependent variable had a much higher IOA, indicating an encouraging potential for the outcomes of the current study.

Future Research

The present study examined the effects of self-monitoring and self-monitoring plus DNRA on writing quantity. In addition to writing quantity, using the two techniques of self-monitoring plus DNRA, future research should also focus on the quality of writing. This

addition may allow researchers to determine whether self-monitoring plus DNRA is more effective for increasing quantity and/or quality.

For the present study, self-monitoring was paired with DNRA. However, there was no individual DNRA condition. Consequently, future research should examine the effects of DNRA alone on the quality and/or quantity of writing. Additionally, the order in which the interventions were given could be counterbalanced (e.g., introduce DNRA prior to self-monitoring) to determine the effectiveness of self-monitoring plus DNRA or DNRA alone prior to a self-monitoring phase.

Although self-monitoring plus DNRA was effective for Stephen, giving him more time to write may have been beneficial. Having a 10-minute time constraint stopped him as he was writing. Future research should examine how DNRA can effect writing with longer periods of time to write. However, to prevent students like Alex from writing less on two probes to leave faster, future research should also add a minimum time constraint and/or number of words written. The time limit restricted one participant from writing more, while it allowed one student to leave faster. Allowing participants to break and/or finish early may cause DNRA to be less motivating. Allowing participants to write as long as they wanted (after a certain period of time) may be beneficial for some students. After a given time and/or number of words written, then a participant could escape the second task. Therefore, it would be beneficial in future research to not allow to break or leave early.

Additionally, adding more attainable ranges of number of words written for participants (less than 50% more of the highest baseline score) may be beneficial in future research. For example, when a participant would write for the full time given (e.g., 10 min.), it may not be as attainable for him or her to write 50% more than the highest point prior to DNRA.

The effects of self-monitoring during the present study did not align with previous research across two participants. Therefore, in the future, researchers should add self-evaluation/goal component to self-monitoring to increase performance. Goal setting with self-monitoring would be another important addition to increase the effectiveness of self-monitoring (Maag, 2018). Additionally, researchers should intentionally draw attention to participant graphs prior to him/her writing.

The topics the students write about are extremely important. If students have a topic they do not find of interest or do not know about, they may not be motivated to write (Hidi & McLaren, 1991). In the future, researchers should include more prompt options and not reuse prompts. Researchers should also survey participants to determine what topics they enjoy doing or talking about. The researcher can get as many as the student will provide. Then, the researcher could determine other topics from talking to parents or guardians about what the participant knows, likes to do, and likes to talk about. The researcher could then have a participant rank order the topics from most to least liked with only the top 50% being used as prompts.

Within the present study, the participant population was diverse in terms of disability and academic performance levels. In the future researchers should use stricter selection criteria to ensure more homogeneity of participants. Further, it would be extremely important for future researchers to conduct a functional behavior assessment (FBA) to determine if escape was the primary function of the behaviors and to the extent of influence it may exert on performance. Similar to Stephen, participants who may benefit from this study would be those who show some interest in writing, but find this task difficult and, consequently, engage in escape behaviors, but by doing so may not reach their full potential while completing writing tasks. Additionally,

future researchers should examine interventions for students with a certain level of proficiency in the area of writing because both self-monitoring and DNRA are motivational strategies, not instructional strategies. Furthermore, many studies include positive reinforcement to enhance instructional or motivational strategies (e.g., Ballard & Glynn, 1975). However, positive reinforcement could be paired with negative reinforcement in future research.

Although the present study allowed participants to plan before the 10-minute probe began, future research should also add specific planning time and include direct instruction and/or feedback to increase writing productivity and quality. Interventions should be designed to meet the specific needs of each participant. Writing is a cognitively complex process, and it requires the use of many strategies, including planning. Therefore, the addition of direct instruction in planning strategies may be beneficial in future research.

Implications for Practice

Results of this study indicated several implications for practitioners. First, while implementing DNRA in the classroom, teachers should plan what students will do after attaining the specified criteria to escape the next task. For instance, students could participate in preferred academic activities that do not interrupt other students' work (e.g., silent read, play an academic game, practice math facts, etc.) or receive a break such as taking a book back to the library. The key is for teachers to have a structured activity during the escape time.

Second, to improve the effectiveness of self-monitoring, teachers should always include a self-evaluation component to self-monitoring. Maag (2018) indicated that adding a self-evaluation component to self-monitoring, which includes allowing students to choose their evaluative criteria (with teacher assistance), they may be more apt to take responsibility for their performance, such as adding a goal for each subsequent session. At the bottom of the bar graph,

there would be an added box labeled, “Goal for next time.” The student would choose a realistic goal to try to meet or exceed during the following session.

Third, while self-monitoring, teachers should bring attention to students’ graphs, informing them to look at the progress they made prior to beginning a writing task. They should also make the graphs to be visually appealing to the student and something in which he or she is interested. For example, if a student likes *Star Wars*, then a bar graph could be made to look like a lightsaber.

Fourth, the topics the students write about are extremely important. If students have a topic they do not find of interest or do not know about, they may not be motivated to write (Hidi & McLaren, 1991). Teachers could ask students topics about what students enjoy to do or talk about (not what they like to *write* about because the word “write” may automatically bring up negative thoughts or feelings). The teacher can get as many ideas as the student will provide. Then, a teacher could determine other topics from what he or she knows about the students or what he or she knows the students at that age know or like to talk. Additionally, a teacher could have a student rank the topics they like to talk about with others (not using the word “write”) in order from most to least. This practice may increase motivation to write because more interesting topics can increase motivation (Hidi & McLaren, 1991).

Fifth, teachers who use DNRA should also provide writing instruction and feedback before and after completion of the writing tasks. With instruction, students can generate ideas with the methods provided by the teacher. Additionally, with feedback, the students can determine what they did correctly and incorrectly, and make changes to current and future writing accordingly.

Last, teachers should understand that for some students who display extremely challenging behaviors, such as those with an emotional or behavioral disorder, DNRA, as described here, may not be an effective intervention. For example, this type of student may simply refuse to write the first task knowing that certain misbehavior (e.g., swearing at the teacher) would get him immediately removed from the classroom and, consequently, escape all task demands regardless of the content explicit in them. In these instances, powerful positive reinforcers may work better than DNRA (Maag, 2018).

Conclusion

The purpose of the present study was to evaluate the effectiveness of using DNRA to enhance self-monitoring for increasing writing productivity using a multiple probe, across participants design. Results demonstrated that some participants responded with increases in number of words and sentences written, while others did not. This study expanded the research on self-monitoring and DNRA in writing by combining two motivational strategies, indicating that together, they may be more effective for some students than when used in isolation. The results of this study show great potential for DNRA to be used to motivate students in the classroom for writing and other subjects. Future research should examine the effectiveness of DNRA alone for motivating students in writing tasks and other academic areas.

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Appendix B

Script for Baseline Session

"We're going to do some writing. I will give you 2 choices of prompts on a piece of lined paper. You will get to choose 1 prompt to write as much as you can about the topic. When you are finished with this task, you will get a short break. Then, you will choose from another 2 prompt options to write a second time. Do you have any questions?"

First Writing Task:

"Here are your 2 options for your first prompt. Which would you like? (read options)

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your first prompt. Try to write as much as you can about the topic. Ready? Go." (start timer)

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minutes to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down." Now, it's time for a break.

Second Writing Task:

"Here are your 2 options for your second prompt. Which would you like (read options)?

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your second prompt. Try to write as much as you can about the topic. Ready? Go."

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minutes to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down." Now, you are finished.

Appendix C

Script used for each Session that used Self-Monitoring

"We're going to do something a little different with the 2 prompts you are writing. At the end of each story you write, you will count up the number of words written and write that in the box in the lower right corner." (Show graph) Then, you will graph that number on the bar by shading each section until reaching the number of words you counted.

Do you have any questions?"

First Writing Task:

"Here are your 2 options for your first prompt. Which would you like? (read options)

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your first prompt. Try to write as much as you can about the topic. Ready? Go. (start timer)."

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minutes to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down."

"Count up the number of words you wrote on this sheet and write that number in the box on the bottom right of your sheet." (participant counts the number of words written and writes it in the box). "Now, graph that number on the bar by shading in each section until reaching that number."

After participant shades graph

Now, it's time for a break."

Second Writing Task:

"After you finish writing, you will count the number of words written and write it in the box. Then, you will graph the number of words you wrote."

"Here are your 2 options for your second prompt. Which would you like? (read options)

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your second prompt. Try to write as much as you can about the topic. Ready? Go."

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minute to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down."

"Count up the number of words you wrote on this sheet and write that number in the box on the bottom right of your sheet." (participant counts the number of words written and writes it in the box). "Now, graph that number on the bar by shading in each section until reaching that number."

After participant shades graph

Now, you are finished."

Appendix D

Script used During the Self-Monitoring-and-DNRA Phase

"We're going to do something different after you complete the first writing task. Like last time you will, count up the number of words written, write that number on in the box on the sheet, and graph that number. But then I have different numbers on pieces of paper in this box. After graphing the number of words, I'm going to pull one of those numbers out of a bag. If the number of words you wrote is the same or greater (bigger) than the number on the piece of paper, you will not have to do the second writing task. But, if the number of words written is less than the number pulled out of the bag, then you will have to do the second writing task just like last time."

Do you have any questions?

First Writing Task:

"Here are your 2 options for your first prompt. Which would you like? (read options)

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your first prompt. Try to write as much as you can about the topic. Ready? Go. (start timer)."

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minutes to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down."

"Count up the number of words you wrote on this sheet and write that number in the box on the bottom right of your sheet." (participant counts the number of words written and writes it in the box). "Now, graph that number on the bar by shading in each section until reaching that number."

If the number is the same or higher than the number drawn out of the bag:

"The number of words you wrote is [the same/higher] than the number that was drawn from the bag. You do not need to complete the second writing task."

If the number is lower than the number drawn out of the bag:

"The number of words you wrote is lower than the number that was drawn from the bag. You will receive a short break, then you will complete a second writing task."

Second Writing Task (if necessary):

"After you finish writing, you will count the number of words written and write it in the box. Then, you will graph the number of words you wrote."

"Here are your 2 options for your second prompt. Which would you like? (read options)

(Point to lined paper) On this page I would like you to write an essay. Do your best writing, and also write neatly so I can read it later.

(Point to blank page) If you'd like, you can use this blank page to plan what you will write.

You chose to write about (read chosen topic again). Do you have any questions?

This is your second prompt. Try to write as much as you can about the topic. Ready, go."

If the participant is still writing at the end of 5 minutes, say:

"You have 5 more minutes to write."

If the participant is still writing at the end of 9 minutes, say:

"You have 1 more minute to write."

After the timer goes off:

"Stop, put your pencil down."

"Count up the number of words you wrote on this sheet and write that number in the box on the bottom right of your sheet." (participant counts the number of words written and writes it in the box). "Now, graph that number on the bar by shading in each section until reaching that number."

After participant shades graph

Now, you are finished."